Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	)	
	)	
Massachusetts Institute of Technology	)	ET Docket No. 19-89
Request for Waiver of Part 15 Ultra-Wideband	)	
Rules for WiTrack Medical Device	)	

REPLY COMMENTS OF WI-FI ALLIANCE

Wi-Fi Alliance submits these reply comments in connection with the above-captioned Petition for Waiver filed by the Massachusetts Institute of Technology (the "Petitioner" or "MIT"), seeking a waiver of Sections 15.503(d), 15.31(c), and 15.521(d) of the Commission's rules to enable certification testing of a new "WiTrack System" for medical monitoring applications.[1/] While Wi-Fi Alliance does not oppose the Petition for Waiver, based on the record in the proceeding to date, it has some concerns regarding the coexistence of the WiTrack System with radio local area networking ("RLAN").

I. ADDITIONAL INFORMATION REGARDING WITRACK USE AND DEPLOYMENT IS NECESSARY TO ASSESS COEXISTENCE

The Petitioner states that the system will use a significant portion of the 6 GHz band.[2/] The Commission is currently evaluating an extensive record filed in response to its Notice of Proposed Rulemaking to allow RLAN equipment into the 6 GHz band, including for indoor

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1/ *See Office of Engineering and Technology Seeks Comment on Massachusetts Institute of Technology Request for Waiver of Part 15 Ultra-Wideband Rules for WiTrack Medical Device*, ET Docket No. 19-89, Public Notice, DA 19-230 (rel. Mar. 29, 2019); Massachusetts Institute of Technology Request for Waiver, ET Docket No. 19-89 (filed Dec. 27, 2018) ("MIT Petition"); 47 C.F.R. §§ 15.503(d), 15.31(c) and 15.521(d).

2/ *See* MIT Petition at 2, 8-9.

use.[3/] Because of the pendency of this rulemaking, obtaining additional information from the Petitioner to better understand its proposed use of this spectrum would be prudent.

No Part 15 devices have protection rights relative to other Part 15 devices, but it is in the interest of all potential users of the band to be able to assess potential coexistence issues that may arise in cases of geographically proximate and simultaneous operations. For example, a WiTrack device operated in the same dwelling as 6 GHz RLAN devices, or in adjacent unaffiliated dwellings (*e.g.*, in an apartment complex), could potentially cause harmful interference to either or both device categories. It would be useful to better understand the likelihood and potential impact of such an event and to prepare for any necessary potential corrective actions, such as coordination among affected users.

Similarly, it would be useful for the Petitioner to elaborate on scenarios and deployment densities where multiple WiTrack devices are either necessary for an individual patient (*e.g.*, coverage in a large home) or are deployed to serve multiple different patients (*e.g.*, in different adjacent rooms of a rehabilitation facility) as this information would be necessary to assess coexistence considerations. Setting aside other Part 15, non-WiTrack, users for the moment, does the Petitioner have a means for multiple adjacent WiTrack device users to deal with any self-coexistence issues that arise? If so, explaining those techniques on the record may aid non-WiTrack Part 15 users in cases where coordination (*e.g.*, device placement, aim, power level reduction) becomes necessary. Does the Petitioner have a recommended maximum number of co-located WiTrack devices and/or a minimum separation distance?

[3/] *See Unlicensed Use of the 6 GHz Band; Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz*, Notice of Proposed Rulemaking, 33 FCC Rcd 10496 (2018).

Broadly speaking, unfortunately, Wi-Fi Alliance has been unable to fully analyze coexistence because several WiTrack operating parameters have not been disclosed in the Petition. The Petitioner should make this information available on the record to assist Commission staff and other interested parties in their review of the waiver.[4/]

II. FURTHER CLARIFICATION OF INFORMATION PRESENTED IS ALSO REQUIRED

MIT's requested waiver is intended to enable "RMS measurements to be done with the swept frequency function active and **the averaging time being set to a full cycle including quiescent time during gating off**."[5/] As Wi-Fi Alliance understands it, this means that using a very large quiescent time within the Device Cycle, the WiTrack system might use high energy during short-burst transmissions. Further, WiTrack devices—in their monitoring role—would apparently operate these Device Cycles on a 24/7, always-on basis. This may disturb the operation of RLAN devices, for example, upsetting the automatic gain control of typical RLAN transmitters, if operating in close proximity. Such operational disturbances compound the effects of interference on RLANs by having an effect similar to that caused by a jammer, further impairing an RLAN receiver's ability to receive RLAN transmissions. Likewise, it is possible that RLAN devices that may transmit in the same frequency range as the WiTrack device may (if operated in close proximity) affect WiTrack measurements. The Petition includes a graphic attempting to display WiTrack array cycles and the quiescent period. For clarity, Wi-Fi Alliance

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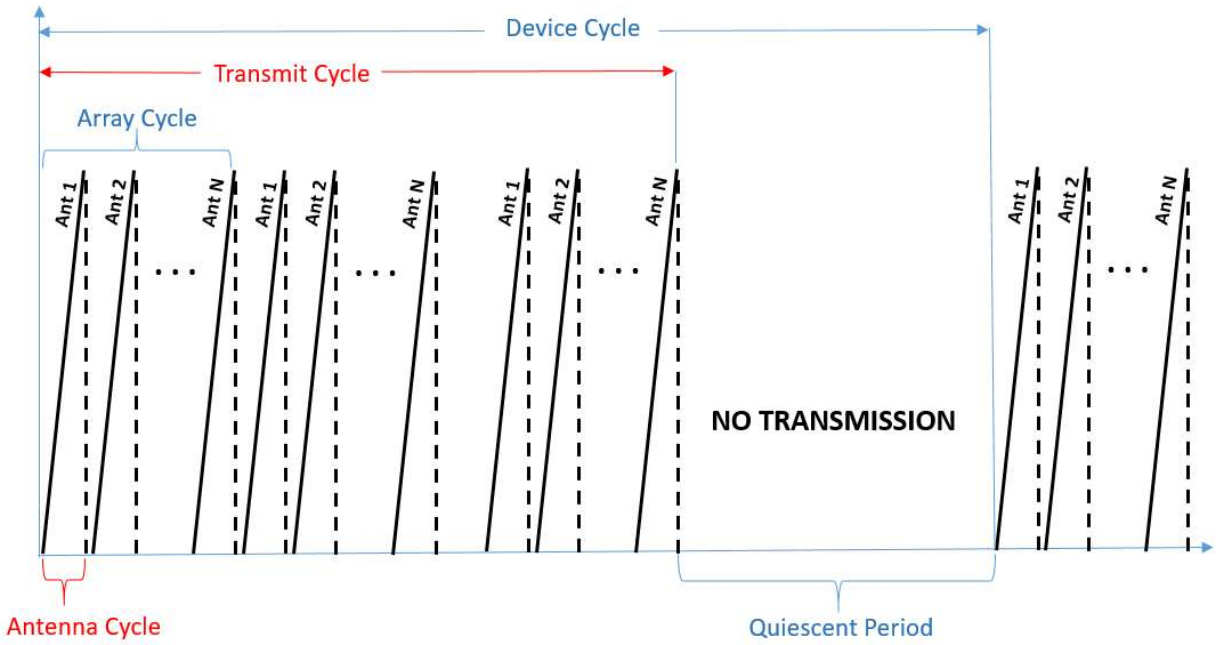
[4/] The questions here are not intended to demonstrate opposition to the proposed Petition or to question the Petitioner's proposed use case or its device's asserted benefits to society. Wi-Fi Alliance is merely seeking additional technical information to aid its analysis.

[5/] MIT Petition at 16 (*emphasis added*). Section 15.521(d) provides, *inter alia*: "Unless otherwise stated, if pulse gating is employed where the transmitter is quiescent for intervals that are long compared to the nominal pulse repetition interval, measurements shall be made with the pulse train gated on." 47 C.F.R. § 15.521(d).

presents below its view of the transmission periods and quiet periods as well as the additional parameters necessary to assist in understanding potential coexistence issues.



To better understand and analyze coexistence, the Petition should be supplemented with the following additional parameters:

- Transmit Cycle: Time duration (typical and maximum) from one to a *maximum* of four Array Cycles
- Antenna Cycle: Time duration of the continuous sweep from 6 GHz to 8.5 GHz (or 7.8 GHz maximum for an alternative device variant), and whether this is constant and linear across the range, *e.g.*, x MHz per microsecond
- Transmit power (conducted power) during each Antenna Cycle, and any variation with frequency
- Number of antennas (N) and antenna gain

Additionally, it would be useful to understand how the Petitioner arrived at the dwell time and instantaneous bandwidth figures, especially in light of the description of the device as being a continuous sweep rather than stepped frequencies. Clarification on what the Petitioner calls "frequency duty cycle" would be particularly helpful. The Petitioner defines this duty cycle as "the ratio of time spent in any 50 kHz band to the shortest interval of time before the device

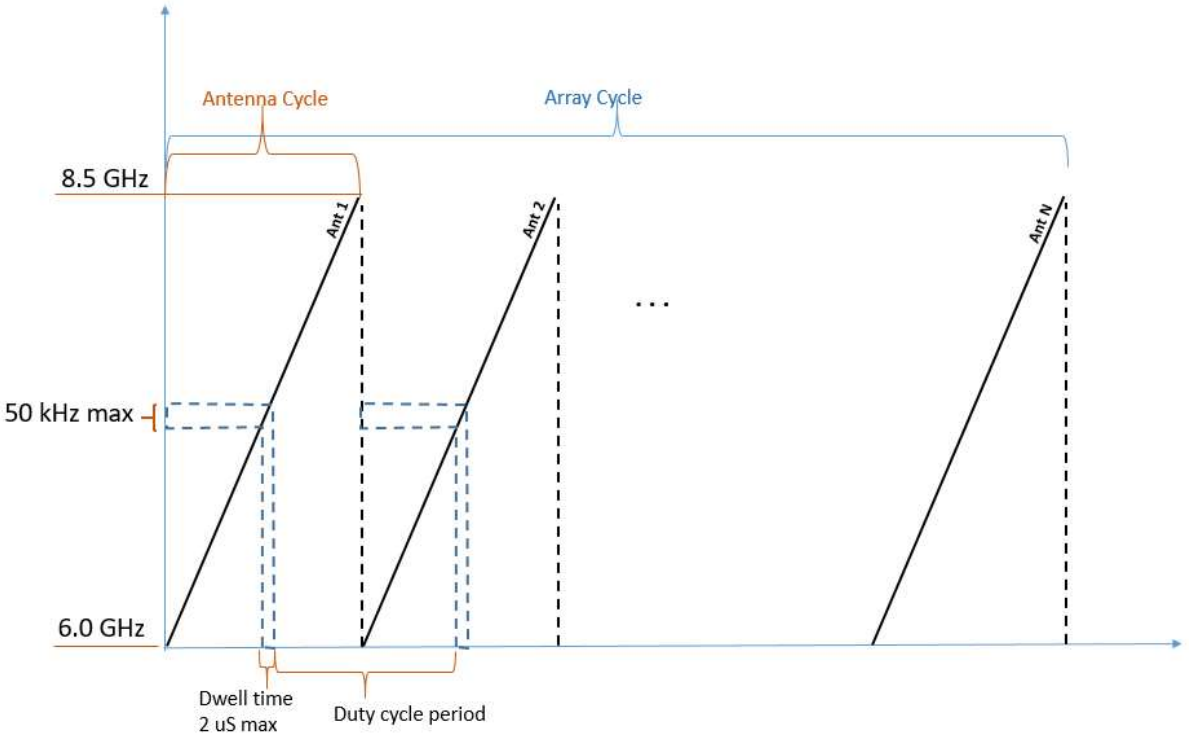
returns to a transmission in that band" and states that it "is less than .04%" – *i.e.*, less than a duty factor of 0.0004.[6/] Given the ambiguity regarding how the Petitioner arrived at the claim that "conservatively, the signal bandwidth at any time is less than 50 KHz"[7/] and the related claim that "[t]he dwell time . . . in any continuous 50 KHz band is less than 2 microseconds",[8/] the coexistence impact cannot easily be determined without more clarification of these parameters. For example, a 2 uS dwell time at 0.0004 duty factor seems to imply the time between antenna #x and antenna #x+1 transmitting the same frequency to be no larger than about 5 mS, but perhaps significantly shorter than that because the Petitioner does not bound its 2uS figure. Quantitative bounds on this, along with the number of antennas because this impacts the burst behavior during the Transmit Cycle, should be added to the record.

Below Wi-Fi Alliance provides an additional figure related to the descriptions and questions above, which attempts to show, in graphical form, its understanding of the WiTrack signaling operation based on the text descriptions provided by the Petitioner.

6/ MIT Petition at 11.

7/ *Id.* at 10.

8/ *Id.* at 11.



Wi-Fi Alliance would appreciate confirmation or correction of its understanding of WiTrack signaling based on the figure above.

Finally, the Petitioner states that "the WiTrack device transmits at a very low peak power, as required by part 15 subpart F"[9/] and that the average power limit of -41.3 dBm will also be satisfied.[10/] However, given WiTrack's non-standard operations acknowledged by the Petitioner and the waiver conditions requested, details of the calculations for peak and average power should be an essential supplement to the record:

- Peak and average power calculations: what are the time dependencies and how are the "dwell time" and "instantaneous bandwidth" factored into the calculation,[11/] and how is the determination of the (minimum, maximum) quiescent period made as part of this calculation

9/ *Id.* at 9.

10/ *See id.*

11/ *See id.* at 10-11.

III. CONCLUSION

Wi-Fi Alliance encourages the Commission to obtain the information required for a Part 15 coexistence analysis from the Petitioner prior to acting on the waiver. It looks forward to working with the Petitioner and the Commission to understand coexistence issues impacting RLAN use of 6 GHz.

Respectfully submitted,

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